CLAIMS

What is claimed is:

1. A method of performing diversity antenna selection, comprising the steps of:

taking measurements from L different antenna branches n antenna branches at a time;

using the measurements to identify a group of n of the L different antenna branches that minimizes an approximate bit error probability of a signal that will eventually be constructed from sub-carriers that are each received by any one of the n antenna branches in the identified group of n antenna branches; and

selecting the identified group of n antenna branches.

2. A method in accordance with claim 1, wherein the measurements comprise power measurements of each of K sub-carriers.

3. A method in accordance with claim 2, wherein the step of using the measurements to identify a group of n of the L different antenna branches further comprises the step of:

computing an approximate bit error probability for each of the K sub-carriers for each of the L antenna branches n antenna branches at a time.

4. A method in accordance with claim 3, wherein the step of using the measurements to identify a group of n of the L different antenna branches further comprises the steps of:

forming different groupings of n antenna branches from among

the L different antenna branches; and

for each different grouping of n antenna branches, selecting a minimum one of the approximate bit error probabilities for each one of the K sub-carriers.

5. A method in accordance with claim 4, wherein the step of using the measurements to identify a group of n of the L different antenna branches further comprises the step of:

for each different grouping of n antenna branches, summing the minimum ones of the approximate bit error probabilities that were selected for each one of the K sub-carriers.

6. A method in accordance with claim 5, wherein the step of using the measurements to identify a group of n of the L different antenna branches further comprises the steps of:

determining which sum of the minimum ones of the approximate bit error probabilities has a smallest value; and

selecting the grouping of n antenna branches that produced the sum of the minimum ones of the approximate bit error probabilities having the smallest value.

7. A method in accordance with claim 1, further comprising the step of:

calibrating a gain between n radio frequency (RF) receive paths.

8. A method in accordance with claim 7, wherein the step of calibrating a gain between n RF receive paths further comprises the steps of:

measuring a signal power received by a first one of the L antenna branches with a first receive path; and

measuring the signal power received by the first one of the L

antenna branches with a second receive path.

9. A method in accordance with claim 3, wherein the step of computing an approximate bit error probability for each of the K sub-carriers for each of the L antenna branches n antenna branches at a time further comprises the step of:

computing an approximate power magnitude for each of the K sub-carriers for each of the L antenna branches n antenna branches at a time based on the power measurements.

10. A method in accordance with claim 9, wherein the step of computing an approximate bit error probability for each of the K sub-carriers for each of the L antenna branches n antenna branches at a time further comprises the step of:

approximating a Q-function for each of the K sub-carriers for each of the L antenna branches n antenna branches at a time with a corresponding approximate power magnitude comprising an argument thereof.

11. A method in accordance with claim 3, wherein the step of using the measurements to identify a group of n of the L different antenna branches further comprises the step of:

storing the computed approximate bit error probabilities.

12. A method in accordance with claim 4, wherein the step of forming different groupings of n antenna branches from among the L different antenna branches comprises the step of:

multiplexing approximate bit error probabilities corresponding to n antenna branches.

13. A method in accordance with claim 2, wherein the K sub-carriers form an orthogonal frequency division multiplexing (OFDM) signal.

14. A method in accordance with claim 1, wherein the step of taking measurements from L different antenna branches n antenna branches at a time comprises the steps of:

receiving a frame that includes a diversity selection portion comprising one or more antenna branch probing portions; and

taking measurements from n antenna branches during one of the antenna branch probing portions.

15. A method in accordance with claim 14, wherein the step taking measurements from n antenna branches during one of the antenna branch probing portions comprises the step of:

taking measurements from each one of the n antenna branches with a separate one of n radio frequency receivers.

16. A method in accordance with claim 1, further comprising the step of:

constructing an output signal from sub-carriers that are each received by any one of the n antenna branches in the selected identified group of n antenna branches.

17. A method in accordance with claim 16, wherein the step of constructing an output signal from sub-carriers comprises the steps of:

computing an approximate power magnitude for each of K sub-carriers for each of the n antenna branches in the selected identified group of n antenna branches; and

comparing the approximate power magnitudes for each of the K sub-carriers for each of the n antenna branches in the selected identified

group of n antenna branches with the approximate power magnitudes for each of the respective K sub-carriers for each of the other n antenna branches in the selected identified group of n antenna branches.

18. A method in accordance with claim 17, wherein the step of constructing an output signal from sub-carriers further comprises the step of:

based on results of the comparing step, selecting sub-carriers from one or more of the n antenna branches in the selected identified group of n antenna branches to form the output signal.

19. A method in accordance with claim 18, wherein the step of constructing an output signal from sub-carriers further comprises the step of:

storing results of the comparing step.

20. An apparatus that includes a diversity antenna selection module, wherein the diversity antenna selection module comprises:

a first computation stage configured to compute an approximate bit error probability for each of K sub-carriers for each of L different antenna branches n antenna branches at a time; and

a second computation stage configured to process the approximate bit error probabilities to identify a group of n of the L different antenna branches that minimizes an approximate bit error probability of a signal that will eventually be constructed from sub-carriers that are each received by any one of the n antenna branches in the identified group of n antenna branches.

21. An apparatus in accordance with claim 20, wherein the second computation stage further comprises:

a multiplexer configured to form different groupings of n antenna branches from among the L different antenna branches; and

a minimum function stage configured to select a minimum one of the approximate bit error probabilities for each one of the K sub-carriers for each different grouping of n antenna branches.

22. An apparatus in accordance with claim 21, wherein the second computation stage further comprises:

a summation stage configured to sum the minimum ones of the approximate bit error probabilities that were selected for each one of the K sub-carriers for each different grouping of n antenna branches.

23. An apparatus in accordance with claim 22, wherein the second computation stage further comprises:

a minimum metric selection stage configured to determine which sum of the minimum ones of the approximate bit error probabilities has a smallest value; and

a diversity antenna decision stage configured to select the grouping of n antenna branches that produced the sum of the minimum ones of the approximate bit error probabilities having the smallest value.

24. An apparatus in accordance with claim 20, wherein the second computation stage further comprises:

memories for storing the computed approximate bit error probabilities.

25. An apparatus in accordance with claim 20, wherein the first computation stage further comprises:

n power measurement stages each configured to compute an approximate power magnitude for each of K sub-carriers.

26. An apparatus in accordance with claim 25, wherein the first computation stage further comprises:

n Q-function stages each configured to process approximate power magnitudes.

27. An apparatus in accordance with claim 20, further comprising:

n radio frequency receivers coupled to the diversity antenna selection module.

28. An apparatus in accordance with claim 20, further comprising:

an antenna selection stage configured to allow each of n different radio frequency receivers to be coupled to any one of the L different antenna branches.

29. An apparatus in accordance with claim 20, further comprising:

a diversity antenna structure having L different antenna branches.

30. An apparatus in accordance with claim 20, further comprising:

a sub-carrier selection diversity module configured to construct an output signal from sub-carriers that are each received by any one of the n antenna branches in the identified group of n antenna branches.

31. An apparatus in accordance with claim 30, wherein the sub-carrier selection diversity module comprises:

n power measurement stages each configured to compute an approximate power magnitude for each of K sub-carriers for one of the n antenna branches in the identified group of n antenna branches; and

a comparator configured to compare the approximate power magnitudes for each of the K sub-carriers for each of the n antenna branches in the identified group of n antenna branches with the approximate power magnitudes for each of the respective K sub-carriers for each of the other n antenna branches in the identified group of n antenna branches.

32. An apparatus in accordance with claim 31, wherein the sub-carrier selection diversity module further comprises:

a multiplexer configured to select sub-carriers from one or more of the n antenna branches in the identified group of n antenna branches based on data generated by the comparator to form the output signal.

33. An apparatus in accordance with claim 32, wherein the sub-carrier selection diversity module further comprises:

a memory configured to store the data generated by the comparator.

34. A diversity antenna selection module, comprising:

means for taking measurements from L different antenna branches n antenna branches at a time;

means for using the measurements to identify a group of n of the L different antenna branches that minimizes an approximate bit error probability of a signal that will eventually be constructed from sub-carriers that are each received by any one of the n antenna branches in the identified group of n antenna branches; and

means for selecting the identified group of n antenna branches.

35. A diversity antenna selection module in accordance with claim 34, wherein the measurements comprise power measurements of each of K sub-carriers.

36. A diversity antenna selection module in accordance with claim 35, wherein the means for using the measurements to identify a group of n of the L different antenna branches further comprises:

means for computing an approximate bit error probability for each of the K sub-carriers for each of the L antenna branches n antenna branches at a time.

37. A diversity antenna selection module in accordance with claim 36, wherein the means for using the measurements to identify a group of n of the L different antenna branches further comprises:

means for forming different groupings of n antenna branches from among the L different antenna branches; and

means for selecting a minimum one of the approximate bit error probabilities for each one of the K sub-carriers for each different grouping of n antenna branches.

38. A diversity antenna selection module in accordance with claim 37, wherein the means for using the measurements to identify a group of n of the L different antenna branches further comprises:

means for summing the minimum ones of the approximate bit error probabilities that were selected for each one of the K sub-carriers for each different grouping of n antenna branches.

39. A diversity antenna selection module in accordance with claim 38, wherein the means for using the measurements to identify a group of n of the L different antenna branches further comprises:

means for determining which sum of the minimum ones of the approximate bit error probabilities has a smallest value; and

means for selecting the grouping of n antenna branches that produced the sum of the minimum ones of the approximate bit error probabilities having the smallest value.

40. A diversity antenna selection module in accordance with claim 34, further comprising:

means for calibrating a gain between n radio frequency (RF) receive paths.

41. A diversity antenna selection module in accordance with claim 40, wherein the means for calibrating a gain between n RF receive paths comprises:

means for measuring a signal power received by a first one of the L antenna branches with a first receive path; and

means for measuring the signal power received by the first one of the L antenna branches with a second receive path.

42. A diversity antenna selection module in accordance with claim 34, wherein the means for taking measurements from L different antenna branches n antenna branches at a time comprises:

means for receiving a frame that includes a diversity selection portion comprising one or more antenna branch probing portions; and

means for taking measurements from n antenna branches during one of the antenna branch probing portions.

43. A diversity antenna selection module in accordance with claim 42, wherein the means for taking measurements from n antenna branches during one of the antenna branch probing portions comprises:

n radio frequency receivers with each one being configured to take measurements from one of the n antenna branches during one of the antenna branch probing portions.